

# Using InRoads Survey for Data Reduction

## Course Curriculum

Revised: January 2010

### **Duration:**

Four days

### **Prerequisites:**

Prerequisite courses are:

- *CDOT MicroStation Essentials* or a working knowledge of MicroStation

### **Course Objectives:**

The purpose of this course is to teach the students how process raw survey data and output it into the desired formats for use in the design process using InRoads Survey tools.

This course will address:

- The relationship between MicroStation and InRoads Survey
- Managing a fieldbook file
- How to effectively use control codes to automate the creation of design graphics (planimetrics)
- Creating basemap drawings, surfaces, and geometry from fieldbook data
- Resolving various problems with fieldbook data including control code errors, elevation errors and adding additional points
- Evaluating the results for accuracy and quality control

Refer to the day-to-day schedule for additional objectives for the course.

### **What to Bring:**

The instructor will provide all materials required to complete this class.

### **Resources:**

Students will find electronic copies of the reference material and labs associated with this course online under the *Manuals and Training* page of the CADD and Engineering Innovation web page located at [www.dot.state.co.us/DesignSupport/CADD and Engineering Innovation](http://www.dot.state.co.us/DesignSupport/CADD and Engineering Innovation).

### **Instructional Media:**

This is an instructor-led hands-on course. Each student will have a computer for the duration of the course. The instructor will utilize a whiteboard and projection system for demonstrating key topics and techniques of the software. Students will access the reference material for this course electronically, either locally or online as noted under the section *Resources*.

The instructor will provide each student a hard copy of the lab material. Course data files will be pre-loaded on the computer used in class. As with the reference material, course data files will also be available online for students to download and work through at their convenience.

### **Material Requirements:**

A printed copy of the course labs will be provided in the class. The lab material will be used in conjunction with an electronic copy of the resource manual *InRoads Survey Data Reduction*. Students may be asked to refer to *InRoads Survey Data Reduction* during the lecture portion of the class for detailed explanations of how to use specific InRoads Survey commands and to gain an understanding of the command options.

### **CDOT Standards:**

This course uses all CDOT standard configuration files related to MicroStation, InRoads and InRoads Survey.

## **Class Schedule and Objectives**

### **DAY 1**

#### **Objective:**

The course begins with an introduction to the InRoads Survey interface. From there, students will gain an understanding of what fieldbook files are and how to use them in InRoads Survey. Another important concept that will be taught is the relationship between MicroStation and InRoads Survey. Students will also learn how feature and control codes are used to display survey data from the fieldbook to the MicroStation interface.

#### **1. Getting Started with InRoads Survey - 2.5 hours**

This topic introduces students to the basic InRoads Survey interface, including how to manage design files. Students practice how to interact with InRoads Survey including the menu, toolbars, and dialog boxes.

- InRoads Survey interface
- Project Defaults
- Survey toolbar
- View Survey Data toolbar
- Locks toolbar
- Survey Options

**Lab:** Getting Started in InRoads Survey

#### **2. Working with InRoads Survey - 2.5 hours**

Students will learn how to open and view a fieldbook file for a completed project. This process includes creating a working model in MicroStation to view the fieldbook data then dynamically viewing InRoads Survey data using MicroStation as a CAD engine. Key topics included in this section include:

- Opening a fieldbook in InRoads Survey
- Fieldbook Data dialog
- Viewing fieldbook data in MicroStation

**Lab:** Working with InRoads Survey

### 3. Feature Codes and Control Codes - 2.0 hours

Points collected in the field are associated with specific codes that drive how the data is imported into the InRoads Survey fieldbook file. This section will cover how to generate planimetrics (graphics representing topography) using control codes and the following related topics:

- Feature table dialog
- Feature styles
- Reports
- Attributes
- Custom operations

**Lab:** Feature Codes and Control Codes

## DAY 2

### **Objective:**

Students will learn how to import raw survey data into a fieldbook, review and edit the fieldbook data as necessary to reflect real world data, and understand the standard workflow to create deliverables for varying purposes.

**Day 1 Review - 30 minutes**

### 4. Exporting the Fieldbook - 3.0 hours

This section covers the workflow on how to create required CDOT deliverables. This includes creating basemap drawings, surfaces (dtms), and geometry from data contained in the InRoads Survey fieldbook file. The following topics are covered in this section

- Writing survey data to graphics
- How to create a surface from survey data
- Triangulating surfaces
- Creating horizontal and vertical geometry from survey data

**Lab:** Exporting the Fieldbook - Overview

### 5. Importing Data - 2.5 hours

*Working files* are used as a way to review and evaluate survey data prior to creating the final deliverables. This section will cover the established procedure for using working files. This section will also cover how to import raw survey data into a new fieldbook from various data formats including SDR, DC, and ASCII. Topics covered in this section include:

- Managing survey files
- Importing control files
- Importing data collector files
- Resolving code errors
- Finding points in a MicroStation view window

**Lab:** Importing Data

## 6. Fieldbook Edits - 1 hour

Students will learn how to make edits to both feature and control code errors using the Fieldbook Data dialog. Next they will practice locating errors with fieldbook data using the Find Observation and Edit Observation dialog boxes. Finally the student will learn how to add points to the fieldbook. Topics covered in this section include:

- Fieldbook Data dialog
- Find Observation dialog
- Edit Observation dialog
- Correcting fieldbook code errors
- Correcting fieldbook control code errors
- Correcting elevation errors
- Adding points to the fieldbook

**Lab:** Fieldbook Edits

## DAY 3

### **Objective:**

This section will demonstrate what to look for when evaluating the accuracy of fieldbook data. Students will learn advanced error detection methods using a DTM surface. Also included in this section is how to create multiple MicroStation models files as deliverables to use in the design process.

**Day 2 review - 30 minutes**

**Fieldbook Edits (cont'd) - 2 hour**

## 7. DTM Evaluation - 2.5 hours

In order to display contours, features and spot elevations, a surface will be created by exporting survey data to a DTM surface. Students will learn how to evaluate the surface (triangulation network) and identify any errors using the surface tools available in InRoads Survey. Topics covered in this section include:

- Exporting survey data to a surface for evaluation
- Introduction to the Surface Properties dialog
- Identify errors in the surface and what the error represents
- Correcting errors in the fieldbook file including crossing features and incorrect elevations
- Evaluate the surface using surface triangles and contours
- Use the Multipoint Profile tool as a section check

**Lab:** DTM Evaluation

## **8. Exporting the Fieldbook - 2 hours**

Students will learn the procedure for simultaneously creating multiple MicroStation model files with the correct reference files attached. Finally, the existing surface and geometry files will be created for use in the design process. Key topics in this section are:

- Exporting survey data to graphics
- Managing drawings in the \Reference Files folder
- Fieldbook files
- Exporting survey data to surface
- Referencing topography design files
- Exporting survey data to final geometry
- Saving an InRoads project file (rwk)
- Directory clean up

**Lab:** Exporting the Fieldbook

## **DAY 4**

### ***Objective:***

Students will learn how to evaluate and analyze fieldbook data using additional InRoads tools. These tools will be used in additional exercises to show how they can make the evaluation and processing of fieldbook data easier.

**Day 3 review - 30 minutes**

**Exporting the Fieldbook (cont'd) - 1 hour**

## **9. Additional Exercises - 3.0 hours**

This section will concentrate on using the CDOT sheet model workflow to create a variety of sheets. After creating the sheets, students will learn how to measure various features represented by sheet graphics. The following tools will be covered in the lab exercises to follow:

### **Surfaces**

- Locks
- Locks toolbar
- Advanced locks
- Global Scale Factor
- View Surface Display Constrained
- View Contour settings
- Profiles from existing alignments
- Cross sections

### **Survey**

- Survey feature filters

- Importing multiple files
- Generating feature table reports
- Metric survey data to Imperial survey data
- Exporting survey data to a Sokkia SDR file
- Exporting survey data using Text Export Wizard
- Exporting a DC file from TGO
- Merging InRoads Survey fieldbook files

**Labs:** Additional Exercises.

**Courses review / Q & A - 30 minutes**

Review how/where to find help after training.